

Building Green for the Future

Case Studies of Sustainable Development in Michigan

Malletts Creek Branch, Ann Arbor



UrbanCatalystAssociates

Zeb Acuff • Aaron Harris • Larissa Larsen • Bryan Magnus • Allyson Pumphrey

University of Michigan
Ann Arbor, Michigan

June 2005



With its solar orientation, open floor plan, large exterior windows, and chimney-like structures in the roof, the building's design captures the maximum amount of natural sunlight to provide a dynamic and pleasurable atmosphere for learning.



Ann Arbor, Michigan

Malletts Creek Branch

of the Ann Arbor District Library

Project type	Institutional
Project scale	Building and Site
Construction type	New Construction - Urban Infill
Date completed	January 2004
Address	3090 East Eisenhower Parkway, Ann Arbor, MI 48108
Subjects	Energy Efficiency
	Stormwater Management
	Materials Used
	Social Benefits
	Development Processes
	Lessons Learned
	Funding Sources
Total project costs	\$4.38 Million
Building square footage	14,000 sq. ft.
Cost/square foot	\$462/sq. ft.

History

The Malletts Creek branch of the Ann Arbor District Library was built to replace the existing 4,500-square-foot Loving Branch and to further the mission of the Library. The Library selected the local architecture firm, Luckenbach Ziegelman Architects, PLLC, to begin site designs. Early in the process, the firm discovered that Malletts Creek flowed directly through the site in an underground pipe below the surface. Almost immediately, the Library began to assess its options for sustainable site development.

With the assistance of the local watershed advocacy group, Malletts Creek Association, and the project's landscape architecture firm, InSite Design Studio, Inc., the Library's Board of Trustees reviewed the implications and opportunities that the building site possessed. Board President J.D. Lindeberg, an environmental engineer, teamed up with Josie Barnes Parker, the director of the Library, to convince the Board of Trustees to expand the notion of sustainable site development to include the building. This approach would allow the Library to exhibit and showcase the benefits of sustainable development in a highly visible public institution.

Convincing the Board of the benefits of sustainable development involved preparing **life-cycle cost analyses** (based on a 40-year life cycle) and annual energy- and HVAC-savings projections, as well as discussing public perception and education opportunities. The Library's decision to move forward with a sustainable design approach was due in part to the new building's tremendous energy savings, reducing the long-term cost of the building.

life-cycle cost analyses - An objective assessment of the cost of a design feature that allows for production, sales, operation, maintenance, and demolition or recycling costs. The cost also encompasses all the environmental burdens of the product or process through its entire service life.

Energy Efficiency

The building utilizes several energy efficiency techniques and technologies, ranging from simple methods to calibrated systems-monitoring devices. Principally, the building design capitalizes on its solar orientation for both solar heating and use of natural light. Several techniques fully capture these natural benefits; for example, dark-stained concrete floors in key areas capture heat from the winter sun to contribute to the building's thermal mass. To counter the intense heat from the summer sun and minimize traditional AC-unit reliance, motorized awnings and sunshades extend to shade the building's interior. Also, light level sensors minimize the use of artificial light when outside sunlight is at sufficient reading levels.

The building also utilizes **convection cooling** with its four large chimney-like roof structures, as seen in the building photograph below. These structures conduct the circulation of natural air into the operable windows, through the building, and out the top of the chimneys. This method of ventilation reduces the use of forced-air circulation systems and meets indoor air quality requirements. In winter when the chimneys are closed, motor fans located inside the chimneys re-circulate trapped heat.

The building's heating system is a circulating hot-water radiant system in the flooring units. This highly efficient system produces consistent warmth for the entire building and eliminates the noise from a traditional forced-air system.

The vegetated **green roof** contributes to thermal mass, insulating the building from extreme temperatures, thereby reducing the load on heating and cooling units. The **R-value** of a conventional roof is R-19; the Malletts Creek Library green roof has an R-value of R-30.

The Malletts Creek Branch of the Ann Arbor District Library features several green technologies both inside and out; a green roof, bioswales in the parking lot, solar panels, and recycled materials.



convection cooling - The transfer of heat via a fluid motion (typically air). In distributed power systems, this is accomplished by the movement of air over the module or heatsink surface.

green roof - A roof of a building which is partially or completely covered with plants. It may be a tended roof garden or a more self-maintaining system. Green roofs increase roof life span, reduce stormwater runoff, reduce the urban heat island effect, and provide amenity space for building users.

R-value - A unit of thermal resistance used for comparing insulating values of different materials; the higher the R-value of a material, the greater its insulating properties.

The sediment trap in the bioswales capture sediment and pollutants from the parking lot runoff, protecting the habitats and water quality of Malletts Creek and further downstream.



Stormwater Management

Recently, Washtenaw County passed new, more stringent watershed guidelines. These new guidelines mandate that new development must be responsible for 100% of the stormwater that falls onto the site, i.e. capturing, storing, and cleaning the stormwater before being slowly discharged into conventional storm sewer systems, and

ultimately into the Huron River. The position of the Library's site directly above Malletts Creek increases the importance of handling stormwater responsibly. The Library selected the landscape architecture firm, InSite Design Studio, Inc, precisely because of its experience and technical knowledge solving similar challenging stormwater problems.

InSite Design's plan for the 2.66 acre site utilizes a variety of stormwater management methods. These include careful site grading, a vegetated swale, bioswales within the parking lot, and a vegetated green roof. The grading of the site allows the stormwater to travel the longest possible distance on the surface of the site along a vegetated swale before it enters the detention area. This swale provides the greatest opportunity for the stormwater to evaporate, infiltrate, or be taken up by the native plants, and reduces the amount of stormwater that enters the detention area. This long travel path for the water allows for the reduced size of the detention pond.

The bioswales within the parking lot utilize a highly engineered system for collecting stormwater from the parking lot and dealing with the sediments and pollutants that parking lot runoff carries with it.

The bioswales at the Malletts Creek site are designed to capture a maximum of 6" of stormwater runoff, which handles the first flush of most storm events. This **first flush** is the stormwater that falls at the beginning of a storm event and contains the most polluted water that flows into conventional systems. By capturing and cleaning this water, this system controls much of the overall water quality of stormwater that is discharged into Malletts Creek.

In addition to adding to the building's thermal mass, the vegetated green roof contributes significantly to stormwater absorption. With its eight varieties of sedum plants and 3.5" of growing medium, the green roof reduces stormwater runoff by as much as 50% with zero runoff in light rain. Plus, the roof water that does reach the ground is directed into the vegetated swale and becomes part of the larger stormwater system.

By using native vegetation and a grading plan, the parking lot design and landscape plan:

- reduce impervious surface
- eliminate the need for irrigation
- allow for trench footings for building construction
- reduce landscape maintenance

bioswales - A depression in the land designed to capture and infiltrate stormwater by utilizing appropriate vegetation planted on the bottom and side slopes.

first flush - The condition, often occurring in storm sewer discharges, in which a disproportionately high pollutional load is carried to the first portion of the discharge or overflow.

Sustainable and Recycled Materials in the Malletts Creek Branch Library

- Cork flooring
- Woven carpet
- Stained concrete
- Butcher block table and shelving tops
- Certified wood beam structural frame
- 50% recycled-content gyp board
- Copper cladding
- Masonry units

Materials Use

At every level, materials for the construction of the Library were carefully selected not only for their durability, aesthetics, and cost effectiveness, but for their sustainability. Luckenbach Ziegelman Architects researched the materials' recycled content, energy consumption for manufacturing and transport, recyclability, and the extent to which they would become renewable resources. Other considerations for materials included sound-proofing and acoustic quality, light-reflecting ability, and maintenance requirements.

Social Benefits

The Malletts Creek Branch Library capitalizes on its role as a community amenity by showcasing the application of sustainable building principles in a publicly accessible location. Public education about sustainable development begins before the visitor even enters the Library, with interpretive signage located outside the building explaining the stormwater management techniques within the parking lot and on top of the building. Inside the building, the open floor plan and exposed structural elements allow visitors to view aspects of the building construction, such as roof joist construction and electrical conduits. The Library is developing educational signage for the interior of the building to highlight the sustainable materials, energy conserving technologies, and the building's use of sunlight and precipitation that it plans to display in the fall of 2005.

Development Processes

During the construction process, great care was taken to maximize the diversion of waste materials from landfills by collecting materials that could be reused or recycled. Construction supervisors for the building project, Skanska USA Building, Inc., sorted waste materials into various piles such as cardboard, wood, metal, drywall, and concrete. Subcontractors were responsible for their own waste products, providing further incentive to recycle materials. By encouraging recycling of waste materials, 60% of all waste products generated from construction were successfully diverted from landfills.

Skanska also was committed to preserving water quality during the construction process. By first grading the bioswales and permanent site contours, all the stormwater was absorbed on site during the entire construction process, thereby protecting Malletts Creek from sedimentation, erosion, and pollution.

Lessons Learned

Turning the concept of a sustainable library into a reality was a learning process for all parties involved. Integrating new concepts of sustainability while working through the usual complications of working in sync with builder, subcontractors, architects, landscape architects, client, and the public proved challenging, but well worth the effort.

Funding Sources

The Library received a grant from the EPA for \$236,000 to finance the vegetated green roof and water-quality monitoring in the bioswales. The water-quality monitoring program focuses on chemical analysis of the stormwater that travels from the bioswales into the detention pond, before flowing into Malletts Creek. In addition the Library raised \$144,750 in matched funding to contribute to the building fund.

The Bottom Line

Education for everyone involved proved to be crucial to the success of the project. Early in the process, board members of the Library needed to learn to look beyond the higher upfront costs to realize the sustained energy savings for the life of the building. During the process, both the architect and landscape architect learned the value of allowing flexibility in scheduling and material choices. Upon completion of the project, all parties involved agreed that the key to the success of this project was the unwavering commitment of the Library to create a sustainable building that would serve not only the needs of the Library and its community, but the needs of the environment, creating a lasting example that will guide future generations to sustainable solutions for development needs.



The library features several sustainable building materials, such as cork flooring and energy efficient lighting.

References

- Ann Arbor District Library. Malletts Creek Branch Floor Plan. Ann Arbor, MI: Ann Arbor District Library, 2004
- Michigan Department of Environmental Quality. Ann Arbor District Library: Innovative Storm Water System. Lansing, MI: 2004
- PowerPoint Presentation: http://production.aadl.org/malletts/LZA_malletts.ppt
- CAM Magazine Article: Malletts Creek Branch Library - A New Chapter in Green Building by Mary E. Kremposky Fall 2004 pp. 44-54

Contact Information

Client	Ann Arbor District Library, Josie Barnes Parker, Director, (734) 327-4263, parkerj@aadl.org
Contractor	Skanska USA Building, Inc., Anthony Bango, Vice President Preconstruction, (248) 351-8300, anthony.bango@skanskausa.com
Architect	Luckenbach Ziegelman Architects, PLLC Carl Luckenbach, FAIA, Phone: (734) 997-9444, cluckenbach@lzarch.com
Landscape Architect	InSite Design Studio, Inc., Andrea Kevrick, ASLA, (734) 995-4194, akevrick@insite-studio.com

Resources for further information

[http://www.aadl.org/stories/storyReader\\$3003](http://www.aadl.org/stories/storyReader$3003)

<http://www.deq.state.mi.us/documents/deq-ess-nps-ann-arbor-district-library-factsheet.pdf>
<http://www.skanska.com/skanska/templates/page.asp?id=5592>

Urban Catalyst Associates

Urban Catalyst Associates

Urban Catalyst Associates (UCA) is an interdisciplinary team of recent University of Michigan graduate students who have combined their experiences, interests, and educations to create a positive impact on the future of the State of Michigan. The team holds a strong passion for fostering innovative, sustainable development that will shape the evolution of the new urban environment.

In collaboration with the Michigan Department of Environmental Quality, Urban Catalyst Associates developed this handbook to serve as inspiration and ready reference to the development community and other interested groups. As the State furthers its investment in green development, the UCA team hopes that this handbook will encourage developers to infuse elements of environmental sustainability into their planning and development processes.

Urban Catalyst Associates can be contacted via email at uca@uca-michigan.com. See the contact information below for information on contacting individual team members.

Zeb Acuff

Zeb holds Master's degrees from the School of Natural Resources and Environment and the Taubman College of Architecture and Urban Planning, both at the University of Michigan in Ann Arbor. He is also a 2001 graduate of the College of Agriculture and Natural Resources at the University of Delaware. Zeb has extensive experience in farmland preservation and local planning research, as well as familiarity working with demographic and social science media. His professional interests include parks and recreation planning, non-motorized transportation, trails and greenway development, and public transit systems. Zeb and his wife currently reside in Dexter, Michigan. Zeb can be contacted via email at zeb@theacuffs.com.

Bryan Magnus

Bryan graduated from the University of Michigan in April, 2005, with an MBA from the Ross School of Business and a MS from the School of Natural Resources. His undergraduate degree is in Finance and Actuarial Math from Bryant University in Smithfield, Rhode Island. Bryan has extensive knowledge of socially and environmentally responsible business with an emphasis on renewable energy and alternative transportation. He has interned with General Motors' Fuel Cell Activities Group as well as Honeywell's Transportation Systems, and is currently employed by Honeywell TS as a Marketing Analyst. Bryan, his wife Lynn, and their "child" Meadow (dog) live in Ann Arbor, Michigan. Bryan can be contacted via email at magnusb@umich.edu.

Aaron Harris

Aaron will complete his final year at the University of Michigan in spring 2006 with both an MBA from the Ross School of Business and an MS from the School of Natural Resources and Environment. Prior to Michigan, Aaron co-founded Harris Brothers LLC, a real estate development/management company based in Chicago and focused on green building design and environmentally sensitive renovation projects. Upon completion of graduate studies, Aaron plans to return to the real estate field to pursue urban brownfield redevelopment projects. Aaron graduated from the University of Wisconsin-Madison with a BA in Sociology (Honors) and a Certificate in Environmental Studies. Aaron can be contacted via email at aaronmh@umich.edu.

Allyson Pumphrey

Allyson graduated from the School of Natural Resources & Environment with a Master's degree in Landscape Architecture in April 2005. Prior to attending the University of Michigan, she received her BS in Landscape Horticulture & Design from Purdue University in West Lafayette, Indiana. Allyson has experience in residential site design and urban redevelopment projects. Her professional interests include urban trails and greenways, brownfield redevelopment, and urban design. Allyson is employed by InSite Design Studio, Inc. in Ann Arbor, Michigan. Allyson can be contacted via email at apumphrey@insite-studio.com.

Larissa Larsen

Larissa Larsen, Ph.D., is an assistant professor with positions in both the School of Natural Resources and Environment and the Urban Planning Program at the University of Michigan. Larissa has a Master's in Landscape Architecture degree from the University of Guelph in Canada and a Ph.D. in regional planning from the University of Illinois at Urbana-Champaign. Prior to becoming a professor, Larissa practiced landscape architecture and urban planning in Chicago. Her current research investigates the ecological and social impacts of urban settlement patterns. Larissa can be contacted via email at larissal@umich.edu.